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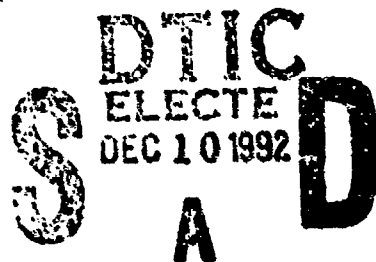


**Study
Report
92-01**

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**Company Commander Survivability
at the National Training Center
(NTC): Initial Analyses for
Attack-and-Defend Battles**

**Robert F. Holz
U.S. Army Research Institute**



**U.S. Army Research Institute for
the Behavioral and Social Sciences**

September 1992

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13. ABSTRACT (Maximum 200 words) For this report, analyses of instrumented data from the National Training Center (NTC) for 42 deliberate attack battles and 31 defend battles were conducted to determine the survivability rates of company commanders. Additionally, information concerning the extent to which commanders who became casualties were firing their weapon(s) before being "hit" and the tactical location of these commanders vis-a-vis the Operating Force when they became casualties was collected and examined. Results revealed an overall survival rate of 70% for company commanders across both types of battles. Armor company commanders during attack battles experienced the lowest survivability. Additional findings indicate that the majority of the commanders who became casualties were not firing their weapons before being hit. Commanders who were hit and those who survived positioned themselves in the forward area of the battlefield. Results agree with earlier reported findings concerning commander survival during WWII and in the Israeli Defense Forces, as well as earlier studies based on NTC battles.				
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FOREWORD

In FY92, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) embarked on a new program to conduct research-based personnel and training studies and analyses. The prime objective of this program is to provide recommendations from studies and analyses that use behavioral and social sciences data and information to support personnel and training decisions, policies, and doctrine and to provide this in a timely fashion. This report is an outcome on that program and was conducted by ARI at its Presidio of Monterey Field Unit.

Under the terms of a Letter of Agreement with the Combined Arms Command-Training, entitled Conduct of Studies and Analyses for FY92 and signed by BG Lyle, CG, CAC-Tng, in August 1992, the ARI Field Unit at the Presidio of Monterey (ARI-POM) is responsible for providing studies and analyses on selected characteristics of units conducting collective training at the U.S. Army Combat Training Centers (CTCs). To facilitate this mission, ARI-POM is the official Army archive of all data and information that are generated by the CTCs.

This report illustrates how data derived from the instrumentation system at the National Training Center (NTC) can be used to support the development of lessons learned. It examines the survival rates of company commanders conducting training on the NTC battlefield and some of the circumstances surrounding commander loss.

The analyses described in this report were conducted in response to requirements from the Center for Army Lessons Learned (CALL) of the Combined Arms Command, Training, Fort Leavenworth, Kansas. CALL's mission includes developing and disseminating lessons learned from the CTCs Armywide. Results of this study have been brief to CALL, which endorses the dissemination of this study and the need for continued studies and analyses that will shed more light on ways to enhance the survivability of commanders on the battlefield.



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The author would like to express his appreciation to and recognize the contributions of Richard Crenshaw, ARI-POM, and Jack Baldwin and Tom Lewman of BDM. These individuals assisted the author in accessing the NTC instrumented data and in understanding the implications of the output. Major Walter Craft, R&D Coordinator at ARI-POM, provided many useful ideas for interpreting the data. Jack Sternberg, also of ARI-POM, served as an unofficial reviewer of earlier versions of the report and provided significant recommendations for its improvement. Any and all errors are the responsibility of the author.

COMPANY COMMANDER SURVIVABILITY AT THE NATIONAL TRAINING CENTER
(NTC): INITIAL ANALYSES FOR ATTACK-AND-DEFEND BATTLES

EXECUTIVE SUMMARY

Requirement:

This study and analysis was initiated in response to a request from the Center for Army Lessons Learned (CALL), Combined Arms Command-Training, at Fort Leavenworth, Kansas, to examine commander survivability at the National Training Center (NTC) and provide interpretations of survival rates in light of past studies and combat experiences. This study is the first in a series.

Procedures:

Instrumented data from the NTC pertaining to changes in the status of company commander vehicles over the course of 73 attack-and-defend battles drawn from 28 battalion task forces were analyzed. The "change" addressed in this study was whether the vehicles assigned to the company commanders were reported as a direct fire "operational kill" during the battle. Since the practice operating at the NTC when these battles were fought was for commanders to be returned to duty after their vehicle was "hit," this change in status was examined the first time such a change took place.

Additionally, data from the Firing Events Table of the NTC Core Instrumentation System (CIS) and computer-generated mission performance automated replay tool (MPART) for attack battles were analyzed to determine whether commanders were firing their weapons systems before being hit and to address the issue of tactical location on the NTC battlefield and survivability/mortality.

Findings:

Results showed a survival rate for company commanders across all battles of 70%. Survivability during armor attack battles was lowest (58%); survivability during mechanized infantry attack battles was highest (82%). The majority (73%) of company commanders whose vehicles were "hit" were not firing their weapons before being hit. While the majority (82%) of the commanders who became casualties were engaged in the "close-in" battle when their vehicles were hit, the majority (76%) of the surviving

commanders were also engaged in the "close-in" battle when the battle ended.

The survivability rates reported mirror those reported by the Israeli Defense Forces for their leaders during the 1973 and 1982 wars and are in agreement with historical data on losses of U.S. Army commanders in actual combat. The findings also agree with earlier reported survival rates of commanders conducting training at the NTC. Lastly, commanders appear to be following current Army doctrine regarding personally engaging the enemy and position on the battlefield.

**COMPANY COMMANDER SURVIVABILITY AT THE NATIONAL TRAINING CENTER
(NTC): INITIAL ANALYSES FOR ATTACK-AND-DEFEND BATTLES**

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**COMPANY COMMANDER SURVIVABILITY AT THE NATIONAL TRAINING CENTER
(NTC): INITIAL ANALYSES FOR ATTACK-AND-DEFEND BATTLES**

REQUIREMENT

The purpose of this study was to conduct analyses of the survivability of commanders at the National Training Center (NTC) and on the circumstances surrounding commander loss during training exercises. This study illustrates the types of analyses that can be conducted based on data derived from the NTC instrumentation system and archived at the ARI-POM Field Unit.

Study Issues

A series of questions were developed to guide the present study and analysis:

1. What is the survivability rate of commanders at the NTC?
2. Does commander survivability vary by NTC mission?
3. Does commander survivability vary by type of Task Force?
4. Is the survivability of commanders related to whether they are members of the "parent" or cross attached battalion?
5. Were commanders who became casualties firing their weapons just prior to becoming casualties?
6. Is the survivability of commanders associated with their tactical location on the NTC battlefield?

Background

Current Army doctrine (FM 100-5) calls for bold, dynamic leadership on the high lethality battlefield envisioned by AirLand Battle. This requirement implies the risk of greater casualty rates for commanders. Given the increased lethality of current weapons systems and the requirements for commanders to "see the battlefield," assessment of commander survivability during rigorous training at the NTC takes on added importance.

Prior studies and analyses regarding the survivability of commanders during simulated training at the NTC (CALL, 1988; Doherty and Atwood, 1987), as well as the survivability of commanders during actual combat (Gal, 1985), suggest that a survivability rate of between 57% and 75% is likely.

The low level of engagements and low losses of U.S. personnel during Operation Desert Storm should not be viewed as the most likely scenario to confront U.S. forces in future battles. Rather, the future battlefield may more likely approximate that envisioned in AirLand Battle doctrine and the survivability of commanders will take on increasing importance.

The National Training Center

The NTC has been designed as a realistic training ground for battalion task forces. Each battalion task force participates in about six force-on-force missions/battles during the two weeks it trains at the NTC. The force-on-force battles use the multiple instrumented laser engagement system (MILES) to record hits (and near-misses) on vehicles and players. These hits are electronically transmitted to computers at the NTC and form the basis for the data used in this report.

The NTC provides the best available laboratory for studying commander survivability on the AirLand Battlefield. Training is conducted under conditions that approximate, as close as possible, combat conditions and the instrumentation of weapons permits assessment of casualties.

TECHNICAL APPROACH

Sample

The sample used for the conduct of this study consisted of the deliberate attack and defend battles carried out by Armor and Mechanized Infantry Battalion Task Forces (TF) at the NTC during FY89. A total of 28 battalion task forces are represented with 73 battles constituting the sample. Thirty one of these battles were defend battles and 42 were attack battles (see Table 1).

Methodology

All data to be reported were obtained from the combat training center archive maintained by ARI-POM. The data tapes were generated by the NTC Core Instrumentation Subsystem (CIS). Additionally, digital replays of selected battles were used to identify the tactical location of commanders whose vehicles became casualties during the deliberate attack battles. The data tapes permit one to identify the vehicle assigned to a commander by the presence of a unique three digit code (e.g., A66 would be the vehicle assigned to the Company Commander of Alpha Company) and to visually "track" that vehicle from start to end of a battle.

The findings that follow are based on the first time a commanders vehicle was reported lost to a direct fire kill during a given battle. Multiple losses and losses due to other factors (i.e. administrative, accidental or OC gun kills) were not addressed. As such, the data on commander survivability to follow reflects a more conservative estimate of such survivability than could be obtained had losses due to such factors as artillery or mines been included. Further, the data apply only to the vehicles of the commanders at the NTC and not to the leaders themselves. Therefore, regardless of whether the commander was in his vehicle when the vehicle was hit it was treated as an operational loss. Computations of commander survivability were calculated based on the proportion of commanders surviving a battle.

For each battle in the sample, tables were generated indicating changes in the status of the BLUFOR company commander's vehicles throughout the battle. The time of such a player status change was also tabulated. The tables generated formed the basis for the results to be presented.

INITIAL FINDINGS

Inspection of the data in Table 1 indicates a total of 73 battles are represented in the sample. Of these, the Armor Task Force conducted 38, while the Mechanized Infantry Task Force conducted 35.

TABLE 1

Sampled Battles by Task Force Type

	Attack	Defend	Combined
Armor TF	22	16	38
Mechanized Infantry TF	20	15	35
Totals	42	31	73

Overall Commander Survivability and Type of Battle Fought

As can be seen in Table 2, the survival of company commanders across the 73 battles was 70%. Of the 327 company commanders who fought in these battles 229 survived. Comparing the survival rates for these commanders in the attack and defend battles yielded nonstatistically significant differences. Survivability of company commanders does not appear to be related to the type of battle fought.

TABLE 2

Company Commander Survivability by Type Battle

	Attack	Defend	Combined
Survival	133/188	96/139	229/327
Rate	71%	69%	70%

Survivability and Type of Task Force Fighting the Battle

Survivability was found to differ for commanders in the Armor and Mechanized Infantry Task Forces (see Table 3). In the case of the Armor Task Forces, company commander survivability across the 38 battles fought was 63% while their counterparts in the Mechanized Infantry Task Forces had a survival rate of 76% (chi square=6.38, df=1, p<.05). Based on the above, it would appear that armor commanders are more likely to have lower survivability rates (at the NTC) than their mechanized infantry counterparts.

TABLE 3

Company Commander Survivability by Type of Task Force

	Armor TF	Mech TF
Survival Rate	96/152 63%	133/175 76%

When both type of battle and type of task force were considered (Table 4), the lowest survival rate found was for Armor commanders during attack battles followed by mechanized infantry company commanders during defend battles. The proportion of company commanders surviving each type of battle from each task force was not statistically significant.

TABLE 4

Survival Rates for Commanders by Type Battle and Task Force

	Attack Battles		Defend Battles	
	Armor TF	Mech TF	Armor TF	Mech TF
Surviving Co Cdrs	51/88 58%	82/100 82%	45/64 70%	51/75 68%

Survivability and Organizational Affiliation of Company Commanders

A question that has been raised in previous research (Doherty and Atwood, 1987) is whether the survivability of company commanders varies as a function of the organizational affiliation of these commanders. Specifically, are commanders from the "parent" battalion more likely to become casualties on the NTC battlefield than their cross attached counterparts?

Since the "parent" battalion (whether Armor or Mechanized Infantry) always has more commanders on the battlefield the analysis took this into account by a weighting formula. For the Armor Task Forces, the ratio of tanks to infantry fighting vehicles is roughly 3:1 while in the case of Mechanized Infantry Task Forces, the ratio of fighting vehicles to tanks is roughly 3:2. The survivability rates for company commanders as a function of type of battle fought and whether the commanders were a member of the "parent" or "cross attached" battalions are presented in Table 5.

Analyses of the data in Table 5, on the survivability of company commanders from the "parent" and cross attached battalion across the attack and defend battles yielded nonsignificant results.

TABLE 5

**Company Commander Survivability by Type Battle and
Organizational Affiliation of the Commander**

	Attack Battles		Defend Battles	
	Armor TF	Mech TF	Armor TF	Mech TF
Surviving Co Cdrs in Parent Bn	39/66 59%	49/60 82%	36/48 75%	29/45 64%
Surviving Co Cdrs in Attached Bn	12/22 55%	33/40 83%	9/16 56%	22/30 73%

Based on the above analyses, the survivability of company commander's at the NTC was not found to vary by the type of mission. Survivability does appear to vary by type of task force conducting the battle with more mechanized infantry commanders surviving battles than their armor counterparts. Lastly, while company commander survivability does not appear to be related to the organizational affiliation of the commanders, there is an indication that when conducting defensive operations more effective command and control procedures (e.g. SOPs) are required to make sure that the attached unit can work with the parent unit.

Weapons Firing by Company Commanders Who Become Casualties

The extent to which a commander's vehicle becomes a casualty during a battle might be related, in part, to whether that commander's vehicle was firing its weapon(s) prior to being hit. To address this question, analyses of vehicle firings were computed for those company commander vehicles previously identified as having been hit by the OPFOR. Since it would be expected that the majority of commanders (and other BLUFOR players) would be firing their weapons during defend battles, the analyses were limited to attack battles where company commanders became casualties.

This procedure yielded a total of 30 attack battles in which 132 Company Commanders were engaged. Data from the Core Instrumentation System (CIS) was queried in order to determine whether, in a five minute period prior to becoming a casualty, these commanders were in turn firing their weapon(s) systems.

Results of this initial analysis indicated that across the 30 attack battles a total of 55 Company Commander vehicles were "hit" by the OPFOR. Of these 55 casualties, 15 (27%) were found to have been firing their weapon(s) systems in the five minute period prior to their becoming casualties themselves, see Table 6. Of these 15, 12 (80%) were found to be armor Company Commanders who fired their main gun on average three times in the five minute period prior to being hit.

TABLE 6

**Company Commander Casualties and Company Commander "Fighters"
Attack Battles**

	Armor TF	Mech TF
Total # "Hit"	36	19
	a	b
# Firing Prior to "Hit"	10	5

a 8 out of 10 were Armor Company Commanders

b 4 out of 5 were Armor Company Commanders

Based on these analyses it would appear as though less than one third of all company commanders whose vehicles became casualties during attack battles were involved in fighting their vehicles prior to becoming casualties themselves.

Tactical Location and Survivability/Mortality

Of greater importance than the issue of whether the commander was fighting his vehicle prior to becoming a casualty is the question of where that commander's vehicle was positioned when it became a casualty. Present doctrine states that commanders should position themselves forward on the battlefield so as to be able to influence the battle outcome. Accordingly an analysis of the tactical location of those commanders who became casualties and those who survived battles was conducted to determine whether location was associated with survivability.

To conduct this analysis battle replays were generated for the 30 attack battles where one or more Company Commander's vehicle was reported as lost to OPFOR direct fire. The battle replays are graphical representations generated by computer and are based on data contained in the CIS data tapes from each NTC battle. These replays permit the analyst to identify individual players on the battlefield and to examine where they were located (in relation to both their own forces and the OPFOR) when they became casualties and their location at the end of the battle.

For each of the 30 battles, the individual vehicle assigned to each Company Commander was identified at the start of the battle and then visually tracked through the battle up to the time when that vehicle was reported as having been killed by OPFOR direct fire or, in the case of the surviving commanders, to the end of the battle. The tactical location of that vehicle vis a vis the OPFOR was then assessed in terms of distance (measured in kilometers) from the OPFOR front line of defense. For example, if Alpha Company Commander's vehicle (A66) was previously identified as having been "hit" by the OPFOR at 0730 during a deliberate attack battle, then the A66 vehicle was located on the battle replay and its movement (on the NTC simulated battlefield) was tracked visually up to the time when it was reported to have

been "hit." At that point, the tactical position of that vehicle could be assessed, e.g., A66 at 0730 for attack battle #1 was engaged in passing through the OPFOR minefields when it became a casualty. The same procedure was used for those commanders who survived the battle with their tactical location being noted at the end of the battle.

A total of 116 company commanders fought in the 30 attack battles analyzed. Fifty two of these commanders became casualties and 64 survived. For the 52 company commander vehicles that were reported as having become casualties, 49 could be "tracked" by the battle replays. The movement of each of these vehicles, from the start of the battle until the time it was reported as "hit," was noted. To determine the tactical location of the commanders vehicle when it was hit, the battlefield was divided into three segments: Rear (over 6 km from the OPFOR barriers), Center (between 3 and 5 km from the OPFOR barriers), and Close (2 km or closer to the OPFOR barriers). A tally was made for each commander's vehicle indicating where it was located when hit (see Table 7). For the 64 surviving commanders 51 could be "tracked" by the battle replays. The tactical location of each command vehicle was noted at the end of each battle.

Inspection of the data in Table 7 indicates that the vast majority (82%) of the company commander vehicles were in the forward or close-in portion of the attack battle when their vehicle was "hit." However, three quarters (76%) of the surviving commanders were located in the same close-in or forward portion of the battlefield when the battles ended.

TABLE 7

Location of BLUFOR Company Commander Vehicles
and Survivability/Mortality

	CLOSE	CENTER	REAR
#/% Co Cdr Vehicles Killed	40 (82%)	3 (6%)	6 (12%)
#/% Co Cdr Vehicles Surviving	39 (76%)	6 (12%)	6 (12%)

The results obtained from these analyses indicate that an almost equal proportion of company commanders who became casualties and who survived these attack battles were positioned in the forward portion of the battlefield. Accordingly, the tactical location of the commanders vehicle does not appear to be related to either mortality or survivability.

DISCUSSION

The survival of commanders, during actual combat, is regarded as critical to battle outcome (CALL 88-1). The survival rates for the company commanders in the present sample give grounds for further thought. The survivability of commanders in prior U.S. combat indicates that "where the battle was of high intensity and of critical importance, a loss rate of roughly 30% among commanders during such battles is generally found" (Personal correspondence with the CAC Historian, 1991). The findings from the present study are in accord with these figures.

Data from the Israeli Defense Forces (Gal, 1985) on commander survivability, derived from the high intensity battles fought during the 1973 Arab Israeli War and the 1982 Lebanese war (wars that closely resemble those envisioned by AirLand Battle) reveal a loss rate for Israeli officers of 28% in the 1973 war and 25% in the 1982 conflict. The IDF attributes these leader losses to its policy of requiring leaders to lead from the front, risking themselves first, serving as an example to their men. The findings from the present analysis mirror those reported by the IDF with 30% of Company Commanders being lost during the conduct of the 73 battles fought.

The findings from this study suggest an improvement in commander survivability compared to those reported by in an earlier study of commander survivability at the NTC (Doherty and Atwood, 1987). That study examined Commander survivability across 25 NTC battles (defend, attack and movement to contact) drawn from six task forces in 1986 and 1987. Results showed a survivability rate for Company Commanders of 57% across all battles (vice 70% survival rate for the attack and defend battles in the present study: with 63% of the company commanders in the Armor Task Force surviving and 76% of the company commanders in the Mechanized Infantry Task Force surviving). An important methodological difference between the earlier study and the present one is that the earlier study considered all types of vehicle kills and all types of battles in its computations. The present study used only direct fire operational kills obtained during attack and defend battles. As such, one would expect the present findings to reflect more conservative estimates of casualties. The present findings do parallel those obtained in the 1987 study when one focuses on the survivability of armor commanders. Given the criticality of armor weapons systems on the battlefield, the less than two thirds survival rate for the Armor Company Commanders may call for closer attention.

The findings dealing with whether company commanders whose vehicles subsequently became casualties were fighting their vehicles prior to being hit and those addressing the tactical location of these same commander vehicles when actually reported as hit suggest that current Army doctrine is being followed. In the first case, the majority of company commanders whose vehicles were hit were not found to have been personally fighting their vehicles. Whether their counterparts were doing the same cannot be similarly determined. In the second case, the majority of all

company commanders, whether those who became casualties or those who survived, are positioning themselves in the forward portion of the battlefield, ostensibly so as to be in a better position to command and control their forces.

CONCLUSIONS AND RECOMMENDATIONS

In terms of the specific issues identified for this study the following conclusions and recommendations can be made:

1. What is the survivability rate of commanders at the NTC?
 - a. Overall survivability across both attack and defend battles for Armor and Mechanized Infantry task forces is 70%.
2. Does commander survivability vary by NTC mission?
 - a. No. A similar proportion of commanders survive both the deliberate attack (71%) and defend in sector (69%) battles.
3. Does commander survivability vary by the type of task force conducting the battle?
 - a. Yes. Armor task forces experienced a lower survivability rate (63%) than Mechanized Infantry task forces (76%) across both attack and defend battles.
4. Is the survivability of commanders related to whether they are members of the "parent" or cross attached battalion task force fighting the battles?
 - a. No. An equal proportion of commanders from the "parent" battalion and the cross attached battalion survived the battles examined.
5. For attack battles, were those commanders who became casualties firing their weapon(s) systems prior to their being "killed" by OPFOR direct fire?
 - a. Generally "no." Slightly over a fourth (27%) of the commanders killed were fighting their vehicles prior to their being hit.
 - b. Of those commanders who were firing, the majority (80%) were Armor Commanders.
6. For attack battles, is the tactical location of the commanders vehicle associated with survivability or mortality?
 - a. No. An almost equal proportion of the commanders who became casualties and who survived were located in the close-in or forward portion of the battlefield.

These findings point to the need for units to develop, and practice, commander succession during training given the realities of mortality on the battlefield.

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